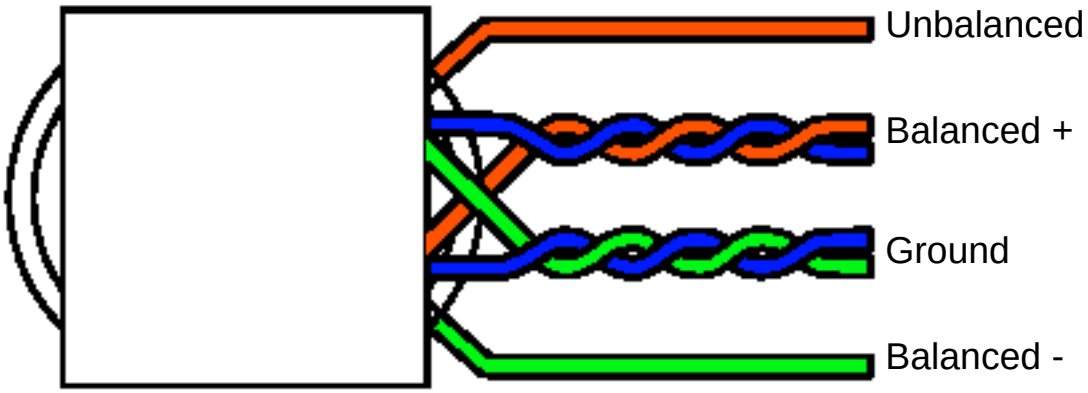
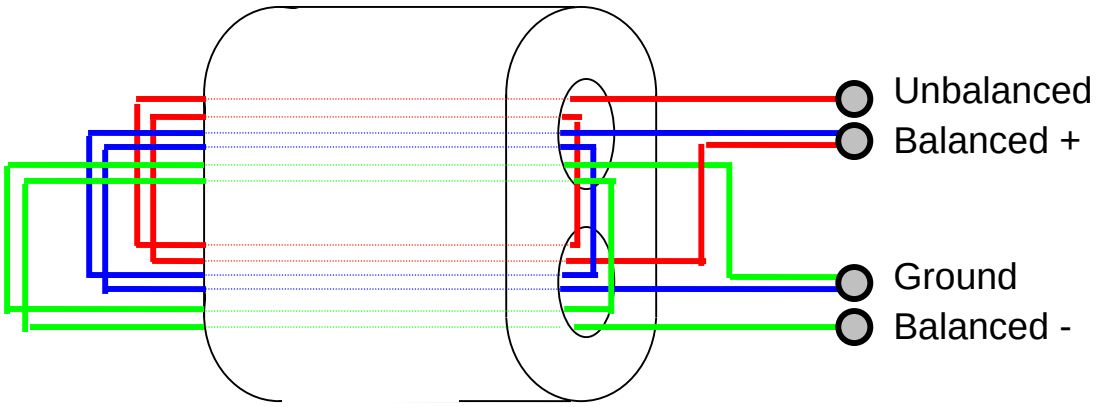
Ferrite core as Balun or Directional Coupler

Trifilar wound 1:1 Balun



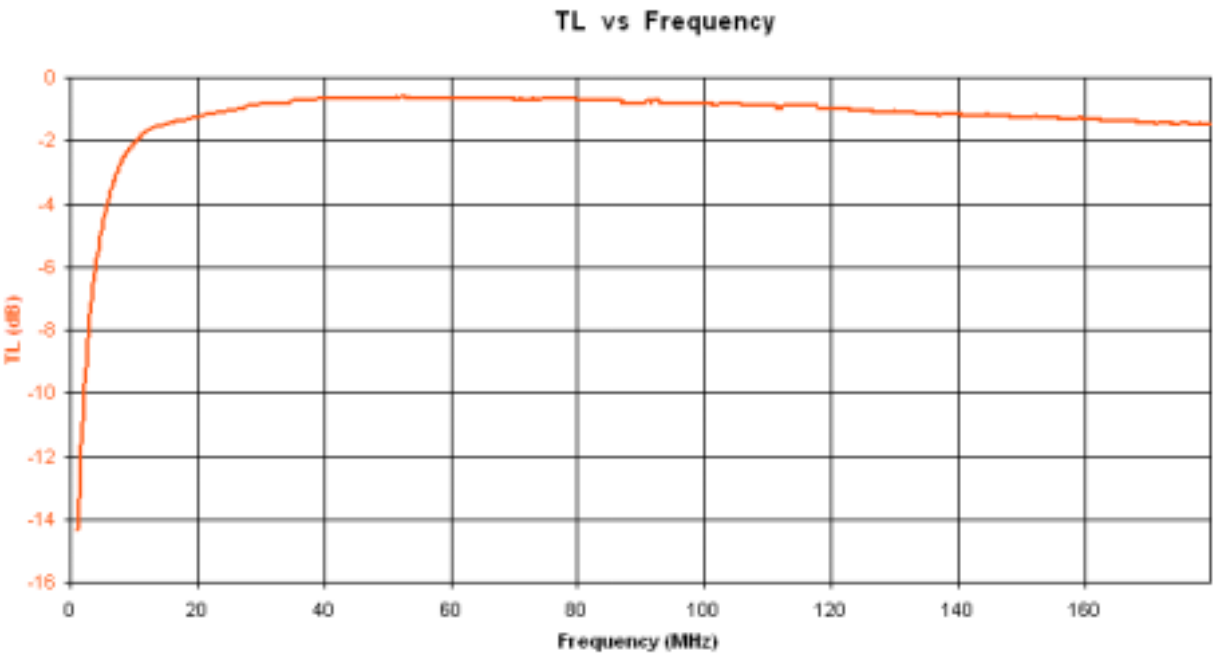
More details of windings



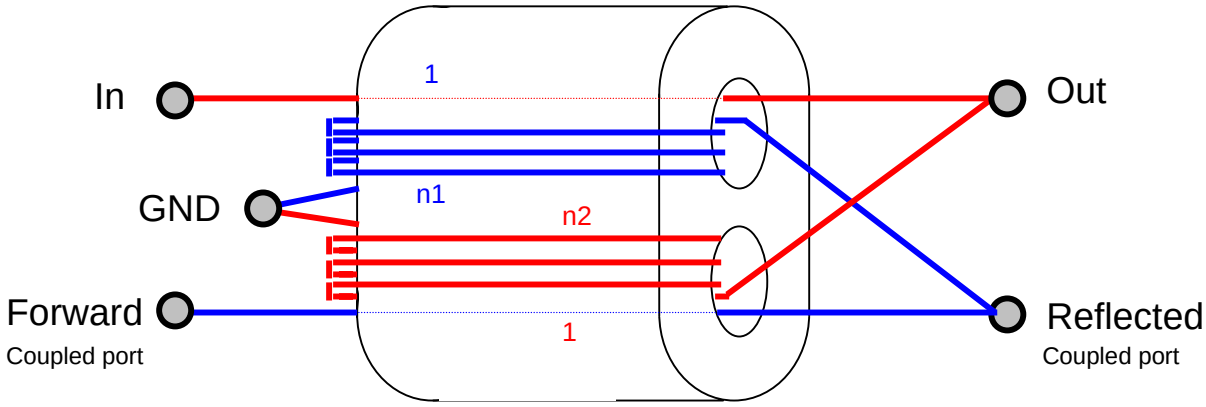
Start by twisting three wires together, then place the twisted wire through the ferrite core. Connect the output to form a 1:1 balun, see figure above.

Loss of balun ≈ 1dB

(*in measurement below I use 2 cores in serial*)

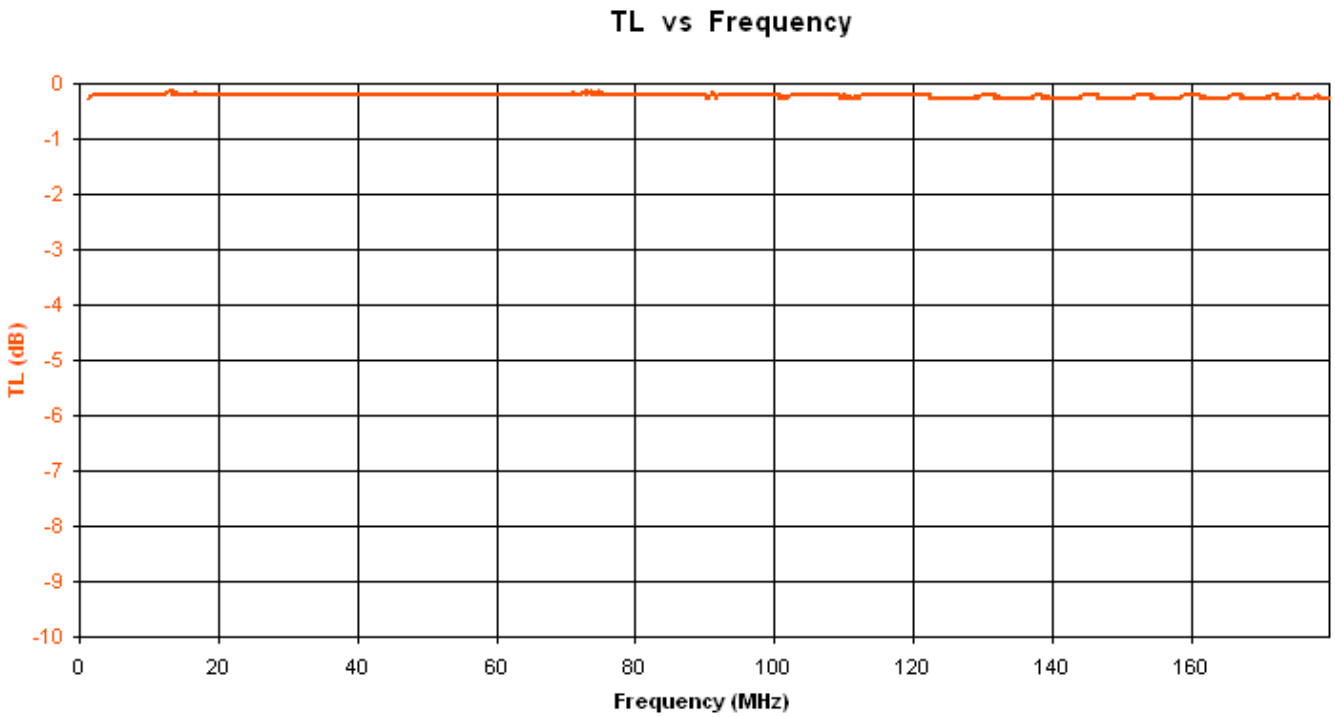


Directional coupler



Loss of coupler ≈ 0.2dB

(*in measurement below I use 1 core with ratio n1, n2 =8. Coupled ports loss was 18dB*)



Directional coupler loss as a function of turns ratio

N1	N2	Insertion Loss	Coupled Port Loss	Input Return Loss	Output Return Loss	Coupled Port Return Loss
1.0	1.0	7.96 dB	1.94 dB	14.0 dB	14.0 dB	14.0 dB
1.5	1.5	2.60 dB	3.94 dB	15.7 dB	15.7 dB	15.7 dB
2.0	2.0	1.29 dB	6.15 dB	19.4 dB	19.4 dB	19.4 dB
2.5	2.5	0.78 dB	8.01 dB	22.7 dB	22.7 dB	22.7 dB
2.5	3.0	0.65 dB	8.76 dB	26.1 dB	22.6 dB	22.6 dB
3.0	2.5	0.65 dB	8.76 dB	22.6 dB	26.1 dB	26.1 dB
3.0	3.0	0.52 dB	9.57 dB	25.6 dB	25.6 dB	25.6 dB
3.0	3.5	0.45 dB	10.2 dB	28.4 dB	25.6 dB	25.6 dB
3.5	3.0	0.44 dB	10.2 dB	25.6 dB	28.4 dB	28.4 dB
3.5	3.5	0.38 dB	10.9 dB	28.2 dB	28.2 dB	28.2 dB
3.5	4.0	0.33 dB	11.5 dB	30.6 dB	28.2 dB	28.2 dB
4.0	3.5	0.33 dB	11.5 dB	28.2 dB	30.6 dB	30.6 dB
4.0	4.0	0.28 dB	12.1 dB	30.4 dB	30.4 dB	30.4 dB
4.0	5.0	0.23 dB	13.0 dB	34.6 dB	30.5 dB	30.5 dB
5.0	4.0	0.23 dB	13.0 dB	30.5 dB	34.6 dB	34.6 dB
5.0	5.0	0.18 dB	14.0 dB	34.2 dB	34.2 dB	34.2 dB
5.0	6.0	0.15 dB	14.7 dB	37.5 dB	34.2 dB	34.2 dB
6.0	5.0	0.15 dB	14.7 dB	34.2 dB	37.5 dB	37.5 dB
6.0	6.0	0.12 dB	15.6 dB	37.3 dB	37.3 dB	37.3 dB
6.0	7.0	0.11 dB	16.2 dB	40.1 dB	37.3 dB	37.3 dB
7.0	6.0	0.11 dB	16.2 dB	37.3 dB	40.1 dB	40.1 dB
7.0	7.0	0.09 dB	16.9 dB	39.9 dB	39.9 dB	39.9 dB